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Abstract

Every year, about 4 million pacemaker surgeries are performed around the world, 1 million of which has to do with pacemaker batteries. The main goal of our project is to create a way to recharge pacemaker batteries, which would greatly reduce the number of operations and related risks. A pacemaker controls the functioning of the heart. It consists of a computer chip and a battery. In our project we show the complete process of how a wirelessly charged pacemaker works. A wireless charger emits magnetic energy through the air and into the receiver of the device. This process is based

on the principle of inductive energy transfer. We used an induction coil to create an alternating magnetic field inside the charging station. The second induction coil was built into the portable device in order to collect the power produced by the magnetic field and turn it into electrical power, which in turn charges the battery. The battery can be charged at a distance of up to 10 mm. The battery used for the prototype is a 1500mAh li-ion battery. It is used together with a circuit for battery control, which will stop the charging process when the battery is fully charged. We made a circuit that simulates the working of a pacemaker. We used an NE555 astable timer with a reset button which represents the heart.

If we stop pressing the button, a 5mm red diode starts to blink in order to simulate electrical impulses. The charging of the transmitter was done using a 5 V DC charger.

The project was successfully completed according to the PUD-BJ model – from the idea to the finished product. All the phases of the model were carefully followed: the idea for the project, the macro- and micro-plans, the step-by-step execution of the project from the idea to the finished product. The product was then tested and presented to the wider public.

Keywords: *pacemaker, heart functioning, pacemaker surgery, wireless battery charging*

Abstrakt

Vsako leto je po celem svetu zaradi vstavitev srčnega spodbujevalnika 4 milijone operacij, od tega je 1 milijon operacij zaradi baterij v srčnem spodbujevalniku. Najin projekt je, da bi lahko napolnili baterije v srčnih spodbujevalnikih in s tem zmanjšali število operacij oziroma tveganj. Srčni spodbujevalnik nadzira delovanje srca. V njem najdemo računalniški čip in baterijo. V projektni nalogi je celoten prikaz, kako bi deloval srčni spodbujevalnik, ki se polni brezžično.

Brezžični polnilec oddaja magnetno energijo preko zraka na sprejemnik naprave, na principu induktivnega prenosa energije. Uporabljala sva indukcijsko tuljavo za ustvarjanje izmeničnega magnetnega polja znotraj polnilne postaje in drugo indukcijsko tuljavo v prenosni napravi, ki pobira moč od magnetnega polja in jo pretvori v električno moč, da napolni baterijo. Baterijo lahko polnimo na razdalji do 10 mm. Na prototipu sva uporabila litij-ionsko baterijo 1500mAh in vezje za nadzor baterije, ki bo prenehalo napajati baterijo, ko bo polna. Zvezala sva vezje za ponazoritev delovanja srčnega spodbujevalnika. Za to vezje sva uporabila NE555 astabilni časovnik, na katerem je reset gumb, ki v tem primeru predstavlja srce. Če nehamo pritiskati gumb, bo začela utripati 5mm rdeča dioda, ki predstavlja električne impulze. Za napajanje oddajnika sva uporabila napajalnik 5V DC.

Projektno delo sva uspešno izvedla po Modelu PUD-BJ-od ideje do izdelka, ter v celoti sledila modelu v zahtevanih fazah: idejna zasnova, makro in mikro načrt, izvedba projekta po korakih-od ideje do izdelka ter izdelek preizkusila in predstavila in razstavila na ogled širši javnosti.

Klíčová slova: *srčni spodbujevalnik, delovanje srca, operacija spodbujevalnika, brezžično polnjenje*

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